

C2

5. (Amended) The article of claim 1 wherein said at least two plies are three plies, wherein two plies have said ply orientation angle of about 30° and the third ply has a orientation angle of about 0°.

C3

7. (Amended) The article of claim 1 comprising four plies wherein two plies have said ply orientation angle of about 23° and two plies have a ply orientation angle of about 45°.

REMARKS

Applicants hereby respectfully traverse the restriction requirement and election of species requirement made by the examiner under 35 U.S.C. 121. Applicants have previously provisionally elected claim Group I, including the species directed to claims 1-6, 9-11 and 13-22, wherein the at least two plies is three plies, and the fiber reinforcement in a third dimension is folds forming the edges of the longitudinal direction. This election was made with traverse. It should be noted that the Commissioner may statutorily require the election of inventions "If two or more independent and distinct inventions are claimed in one application." Applicants submit that the examiner has made no showing of distinctness between the embodiments of claim Groups I-IV, or between the species having three plies or four plies. It is therefore respectfully urged that the restriction and election requirement be rescinded. In any event, applicants confirm their provisional election to prosecute claim Group I and the species mentioned in the office action. It is understood this these elections result in an examination of claims 1-6, 9-11 and 13-22.

The examiner has rejected claims 1-6, 9-11, and 13-22 under 35 U.S.C. 112, first paragraph. The examiner states that at the specification at page 9, lines 17-19 that a PEN cord meeting the twist multiplier limitation would necessarily meet the initial compressive modulus limitations of the claims. By way of clarification, compressive modulus depends on two factors, the twist multiplier and the denier per filament. As a filament gets larger, the ability to bend goes up markedly, usually by a power of three to four of the diameter. Bending makes a great difference in compressive modulus. One cannot make a high denier per filament for solution spun filaments. The materials of this invention are characterized as having a large denier per

filament. Hence, a PEN cord meeting only the twist multiplier limitation would necessarily meet the initial compressive modulus limitations of the claims. In view of this clarification, it is submitted that the 35 U.S.C. 112, first paragraph rejection should be withdrawn.

The examiner has rejected claims 1-6, 9-11, and 13-22 under 35 U.S.C. 112, second paragraph, as being indefinite. The examiner states that the term "fiber orientation angle" should be changed to "cord orientation angle". The correct term is actually "ply orientation angle" which is defined in the specification as "the acute angle formed between the unidirectional reinforcement fibers in the rubber and the circumferential direction of the tire belt, or in a generic composite article, the longitudinal direction of the article." Claims 1, 4, 5 and 7 are amended accordingly.

The examiner also states that claim 5 is unclear as to the number of plies which are present. As suggested by the examiner, Applicants have clarified claim 5 to now state that there are three plies present. It is respectfully requested that the 35 U.S.C. 112 rejection be withdrawn.

The examiner has rejected claims 1-3 under 35 U.S.C. 102 over Inada et al. Applicants respectfully assert that this ground of rejection is not well taken.

The present invention relates to reinforced rubber articles. More particularly, the invention relates to rubber articles reinforced with non-metallic multifilaments, such as those found in belts for tires, and the like. The claims are directed to a fiber-reinforced article comprised of at least two plies wherein each of said plies comprises (a) rubber and (b) cord made from melt-spinnable, non-metallic, multifilament fiber. The cord has a twist multiplier of less than or equal to about 375, a stress at 1% strain greater than or equal to about 1.7 grams/denier, *and an initial compressive modulus greater than or equal to about 7 grams/denier*. Further, the at least two plies have a fiber orientation angle of greater than or equal to about 23°.


Inada et al. also relates to reinforced rubber articles. In particular, it describes a radial tire having a belt comprised of plural belt layers, in which at least one belt layer is formed by arranging

particular twisted cords, which are obtained by twisting particular filament-resin composite bodies at a particular end count.

The examiner asserts that the teachings of the present invention are anticipated by Inada et al. However, Applicants respectfully urge that Inada et al. fails to teach every aspect of the claimed invention. Applicants submit that Inada et al. at least *fails* to teach the use of a cord having an initial compressive modulus greater than or equal to about 7 grams/denier. All of the Inada cords are composed of Aramid (Kevlar) or polyvinyl alcohol. All of these materials are spun from solution and inherently have a low initial compressive modulus, i.e. below 7 grams/denier. By way of comparison, the examiner's attention is drawn to Table 1, page 21 of the specification. Comparative cords A, B and C which are composed of Aramid polymer like Inada, all have a low compressive modulus, i.e. 4.5 or lower. It should be noted that the cord compressive modulus reported in Table 2 of Inada is not comparable to the cord compressive modulus in the instant claims because the modulus of the Inada material is only reported after impregnation of a bundle of filaments with a RFL adhesive. Hence it is submitted that Inada does not anticipate the instant invention. It is therefore submitted that the 35 U.S.C. 102 rejection should be withdrawn.


The undersigned respectfully requests re-examination of this application and believes it is now in condition for allowance. Such action is requested. If the examiner believes there is any matter which prevents allowance of the present application, it is requested that the undersigned be contacted to arrange for an interview which may expedite prosecution.

Respectfully submitted,



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I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office (FAX No. 703- 872-9310) on January 8, 2002.



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APPENDIXMARKED-UP COPY OF AMENDED CLAIMS

1. (Amended) A fiber-reinforced article comprised of at least two plies wherein each of said plies comprises (a) rubber and (b) cord made from melt-spinnable, non-metallic, multifilament fiber, said cord having
  - a twist multiplier of less than or equal to about 375,
  - a stress at 1% strain greater than or equal to about 1.7 grams/denier, and
  - an initial compressive modulus greater than or equal to about 7 grams/denier, and
  - said at least two plies having a [fiber] ply orientation angle of greater than or equal to about 23°.
4. (Amended) The article of claim 1 where said [fiber] ply orientation angle of said at least two plies is greater than or equal to about 26°.
5. (Amended) The article of claim 1 wherein said at least two plies are three plies, wherein two plies have said [fiber] ply orientation angle of about 30° and the third ply has a [fiber] ply orientation angle of about 0°.
7. (Amended) The article of claim 1 comprising four plies wherein two plies have said [fiber] ply orientation angle of about 23° and two plies have a [fiber] ply orientation angle of about 45°.